Express Mail No.: EV 333134533 US
Title: Circuits To Generate A Sequential
Index For An Input Number In A Pre-Defined
List Of Numbers
Inventor: Madian Somasundaram
Atty. Docket No.: 24084-08769
Sheet 1 of 9

102

n bits

Table of
Valid Numbers

Location of Numbers

2^n entries
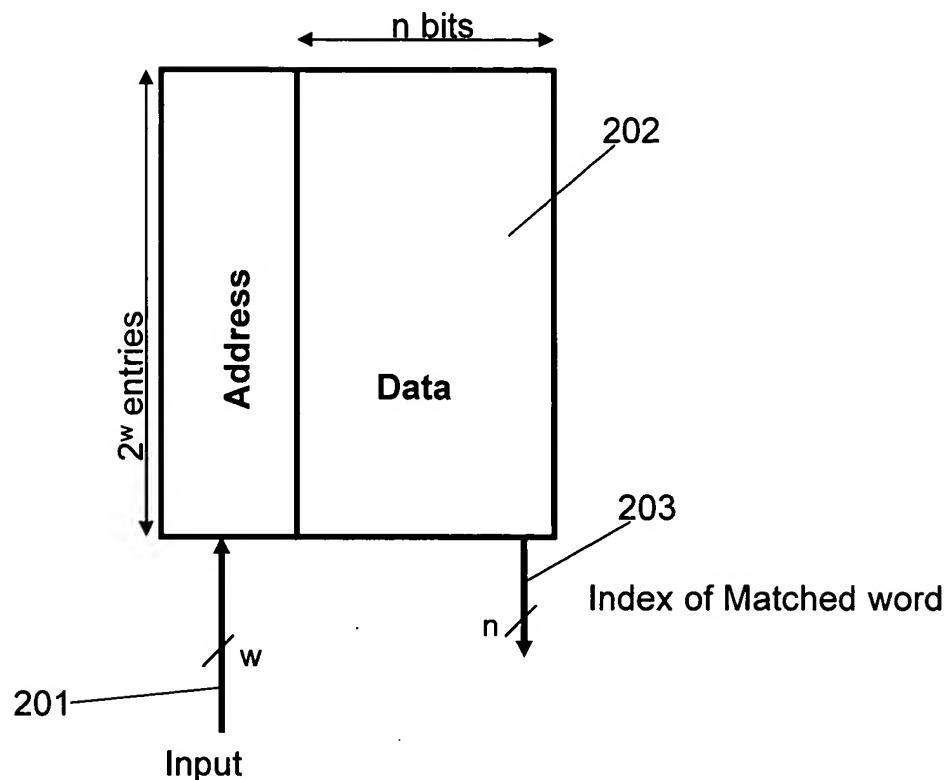
w bits

103

n

w

101

Input

Location of Matched word

FIG. 1
PRIOR ART
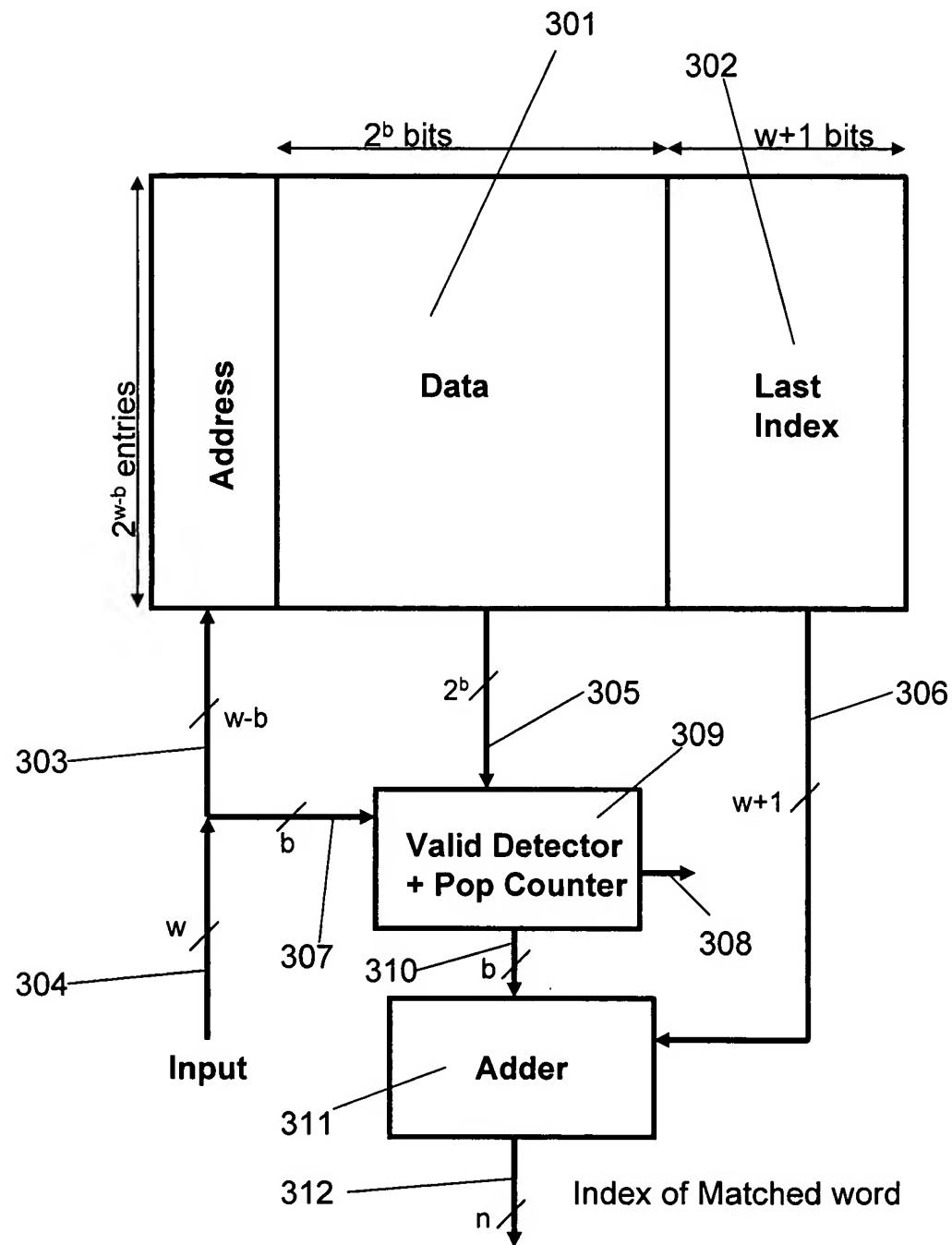
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Numbers
Inventor: Madian Somasundaram
Atty. Docket No.: 24084-08769
Sheet 2 of 9

n bits

202

2^w entries

Address

Data

203

Index of Matched word

n

w

201

Input

FIG. 2
PRIOR ART

Express Mail No.: EV 333134533 US
Title: Circuits To Generate A Sequential Index
For An Input Number In A Pre-Defined List Of
Numbers
Inventor: Madian Somasundaram
Atty. Docket No.: 24084-08769
Sheet 3 of 9

FIG. 3

Express Mail No.: EV 333134533 US
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List Of Numbers
Inventor: Madian Somasundaram
Atty. Docket No.: 24084-08769
Sheet 4 of 9

Index	Word	Value
0	00000111	7
1	00001000	8
2	01001001	73
3	01100110	102
4	01110111	119
5	10000000	128
6	10000001	129
7	11000001	193

FIG. 4

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Atty. Docket No.: 24084-08769
Sheet 5 of 9

Row #	Last Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	-1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FIG. 5

Express Mail No.: EV 333134533 US
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Atty. Docket No.: 24084-08769
Sheet 6 of 9

Input	0100 1001 = 73	1100 0011 = 195
Row Address	0100 = 4	1100 = 12
Bits in selected row	0000 0000 0100 0000	0100 0000 0000 0000
Bit address	1001 = 9	0011 = 3
Value of selected bit	1 = word is present in table	0 = word is not present
Bits input to population counter	0000000001	
Output of population count	1	
Last Index in selected row	1	
Sum of population count and Last Index	1+1 = 2 = index	
Overall result	The input is in the table in location 2.	The input is not in the table

FIG. 6

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List Of Numbers
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Atty. Docket No.: 24084-08769
Sheet 7 of 9

Index	Range
0	3
1	11-20, 22, 25-35
2	87
3	99
4	101-102
5	200-210
6	225
7	245

FIG. 7

Express Mail No.: EV 333134533 US
Title: Circuits To Generate A Sequential Index
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Numbers
Inventor: Madian Somasundaram
Atty. Docket No.: 24084-08769
Sheet 8 of 9

Row #	Last Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	-1	00	00	00	11	00	00	00	00	00	00	00	11	10	10	10	10
1	1	10	10	10	10	10	00	10	00	00	10	10	10	10	10	10	10
2	1	10	10	10	10	00	00	00	00	00	00	00	00	00	00	00	00
3	1	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
4	1	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
5	1	00	00	00	00	00	00	00	11	00	00	00	00	00	00	00	00
6	2	00	00	00	11	00	11	10	00	00	00	00	00	00	00	00	00
7	4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
8	4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
9	4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
10	4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
11	4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
12	4	00	00	00	00	00	00	00	00	11	10	10	10	10	10	10	10
13	5	10	10	10	00	00	00	00	00	00	00	00	00	00	00	00	00
14	5	00	11	00	00	00	00	00	00	00	00	00	00	00	00	00	00
15	6	00	00	00	00	00	11	00	00	00	00	00	00	00	00	00	00

FIG. 8

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Atty. Docket No.: 24084-08769
Sheet 9 of 9

Input	208 = 1101 0000
Row Address	1101 = 13
Bits in selected row	10 10 10 00 00 00 00 00 00 00 00 00 00 00 00 00
Bit address	0000 = 0
Value of selected position	10 = number is in table, but not start of range
Bits input to population counter	0
Output of population count	0
Last Index in selected row	5
Sum of population count and Last Index	0+5 = 5 = index
Overall result	The input is in the table in location 5.

FIG. 9